



*Analysis & Report*

# Comprehensive Examination of the Performance of the Indiana 21st Century Research and Technology Funds

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## Introduction

The purpose of this study is to analyze the performance of 21st Century Fund. To do so we examine data on the Fund and review individual Fund recipients. In order to report the Fund's activities since inception we undertake several specific analyses. We first determine metrics to assess Fund's output and existing processes with regard to firm selection. We then highlight the awards over time and evaluate the validity and effectiveness of the selection processes. To more deeply explore the role of the Fund we analyze the state's R&D efforts by federal agency and academic institutions. To evaluate the role of the Fund with respect to other Indiana economic development efforts we examine the 21st Century Funds target industries. We also review the leading studies of state venture capital with an eye towards the role and processes within the 21st Century Fund. In this section we present other state level venture capital funds for consideration. To examine aggregate short- to medium-term effects of the Fund we use the Indiana REMI model (Regional Economic Model, Inc) to model job creation, income and state GDP effects. Finally, we provide recommendations for improving the outcomes from each measured area, and provide a detailed reference and appendices.

## Background

Indiana's 21st Century Research and Technology Fund was created in 1999 by the Indiana General Assembly to enhance university capacity for commercialization, stimulate R&D efforts in the state, and to assist in diversifying the state's economy. Evaluation of these goals, placed within the context of the state and national economy and the fiscal conditions which accompany them are needed.



## Metrics

The metrics used to analyze the performance of the 21st Century Fund include:

- Distribution of number of the 21st Century Fund's awards by industry vs. employment/establishment/average payroll trends of that industry
- University collaborations of the 21st Century Fund by award amount vs. total non-federal R&D expenditures by universities and industry sectors in Indiana
- Improvement in agency-specific trends of federal obligation for R&D since the 21st Century Fund's inception year
- The 21st Century Fund's SBIR/STTR contribution deals vs. total SBIR/STTR awards for Indiana by agency
- The 21st Century Fund awards vs. Indiana venture capital deals
- Measures of overall economic impact

We have also listed potential metrics that could be measured in the future, under the *Recommendations* section of this report.

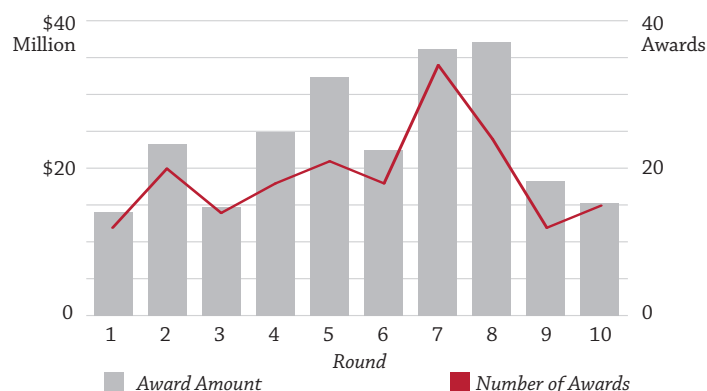
# Description of the Fund

## Quantity

Since its inception, the 21st Century Fund has given 188 awards of \$238.5 million spread across 10 rounds. Award amounts experienced a few peaks and valleys until Round 6, peaking in Round 7 then gradually declining.

The correlation between number of funded projects and award amount were high ( $\rho=87.3\%$ ). This implies that in all the rounds, 21st Century Funds have distributed the award amount across various funded projects, instead of having fewer projects with large award amount.

**Figure 1: Trend of Dollar Amount versus Awards Distributed, Rounds 1-10**



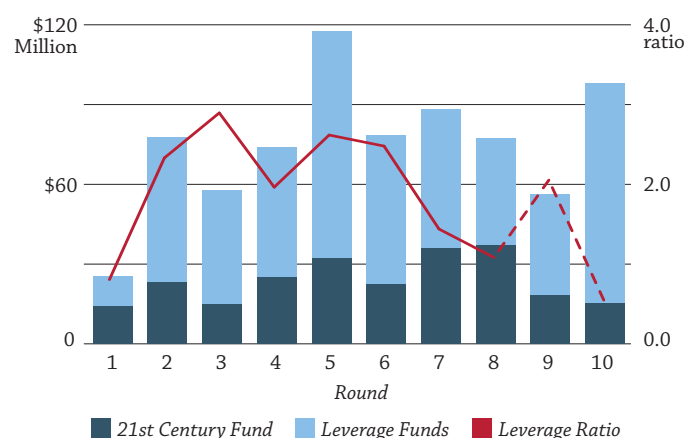
**Definition of Rounds**

R	Year	R	Year	R	Year	R	Year	R	Year
1	1999-00	3	2001-02	5	2003-04	7	2005-07	9	2008-09
2	2000-01	4	2002-03	6	2004-05	8	2007-08	10	2009-10

## Leverage Ratio

In order to cover the project costs, many 21st Century Funds award recipients have leveraged their additional fund requirement from various private/public sources. The leverage ratio<sup>1</sup> has been consistent from round 2 to round 7, with an average ratio of 2.3 over these periods.

**Figure 2: Leverage Ratio**



**Note:** The leverage funds from Round 8 - 10 is not complete, as some projects may receive additional funding in the near future.

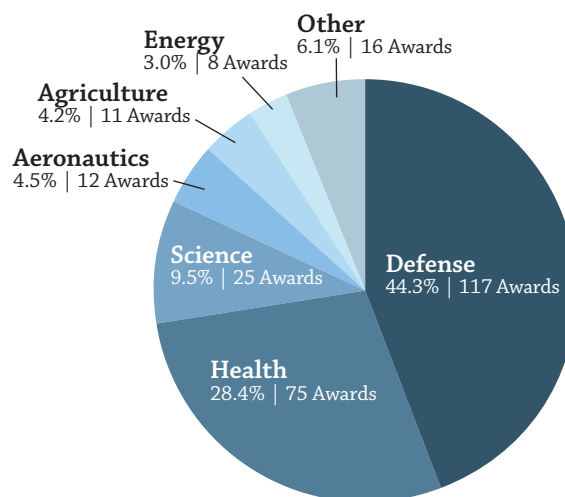
## Type

There were 264 SBIR/STTR matching awards provided by 21st Century Funds as on June 30, 2009. These awards were diversified into various agency specific areas such as defense (44%), health (28%), science (10%), aeronautics (5%), agriculture (4%), and energy (3%).

**Table 1: Type of Award**

Type of Award	Number of Awards	Award Amount
21st Century Fund	188	\$238,344,923
SBIR/STTR Matching	264	\$26,965,231

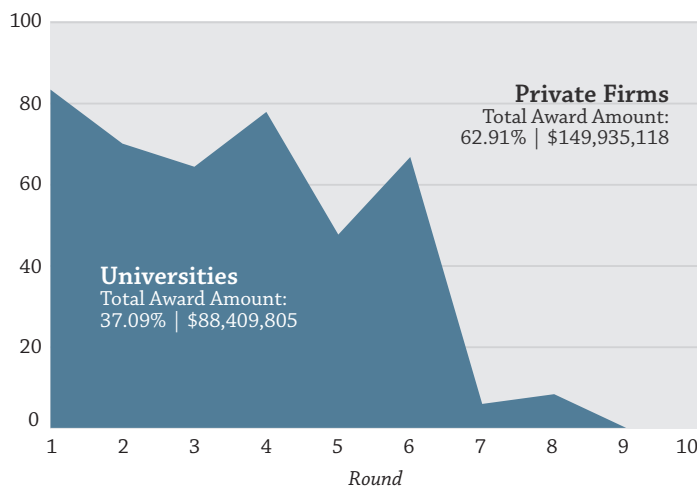
**Figure 3: Frequency of SBIR/STTR Awards by Agency**



# Recipients

During the initial years, bulk of the 21st Century Funds awards were received by universities. This trend was apparent until round 6, after which private sector firms received the majority of the deals. Overall, 73 awardst contributing to 37% of the total award amount was received by various universities in Indiana

Figure 4: Percent Share of Awards by Recipient Type



Definition of Rounds (R)

R	Year	R	Year	R	Year	R	Year	R	Year
1	1999-00	3	2001-02	5	2003-04	7	2005-07	9	2008-09
2	2000-01	4	2002-03	6	2004-05	8	2007-08	10	2009-10

# Industry

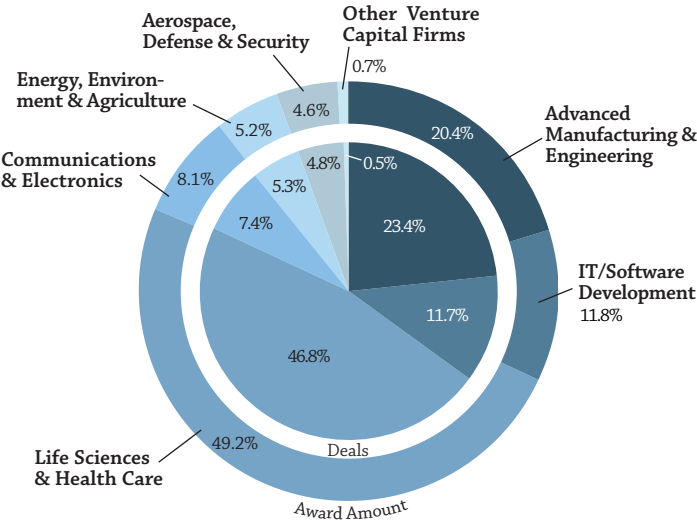
Life sciences and health care projects received 47% of the awards. As a part of fund's goal to assist in diversifying the state's economy, awards were distributed among other high technology sectors such as advanced manufacturing (23%), IT (12%), communications (7%), energy (5%) and aerospace/defense (5%). The percentage share of award amount compared to the number of deals was slightly higher for life science and communications projects, offsetting the amount share of advanced manufacturing/engineering projects.

The 21st Century Fund also focuses investment on diverse economic activity beyond the industrial sector. By targeting funds to firms with potential manufacturing practices in both high technology and 'off the shelf' technology and both entrepreneurial and larger firms, the Fund hopes to aid in bolstering the resiliency of the Indiana economy. Not surprisingly, these differing strategies mature over a long investment cycle and so a full evaluation of this aspect of the Fund's performance requires several more years of data.

Table 2: Awards by Industry

Industry	Number of Awards	Award Amount
<b>Total</b>	<b>188</b>	<b>\$238,344,923</b>
Advanced Manufacturing/Engineering	44	\$48,673,408
Information Technology/Software Development	22	\$28,013,289
Life Sciences/Health Care	88	\$117,167,966
Communications/Electronics	14	\$19,416,581
Energy/Environment/Agriculture	10	\$12,491,283
Aerospace/Defense/Security	9	\$10,983,021
Other Venture Capital Firms	1	\$1,599,375

Figure 5: Industry Share of 21st Century Fund Awards



# Regional Focus

The 188 awards were distributed among twenty-three counties in Indiana. The highest number of awards were received by Tippecanoe County (31%) followed by Marion (28%), St. Joseph (8%) and Hamilton (5%) counties. Advanced manufacturing and life science/health care projects equally shared the majority of deals in Tippecanoe County, where as Marion County witnessed majority of life science/health care industry related projects.

Figure 6: Awards by County

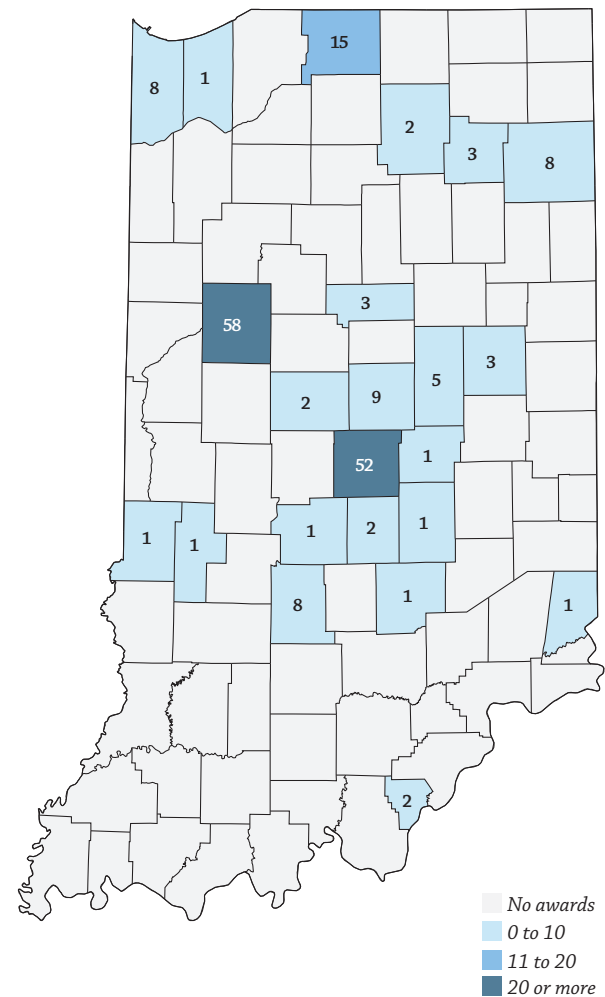


Figure 7: County Share of 21st Century Fund Awards

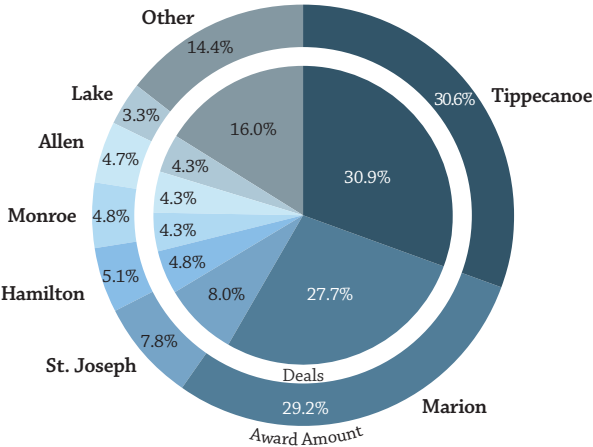
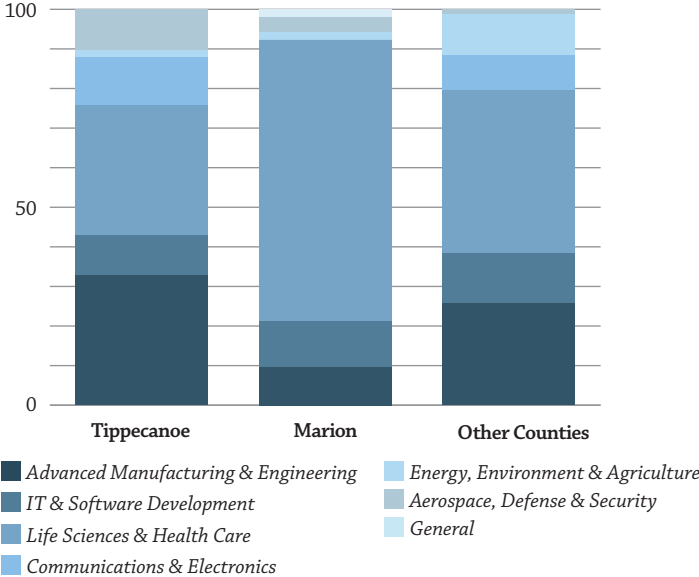


Figure 8: Percent Share of Deals by Industry

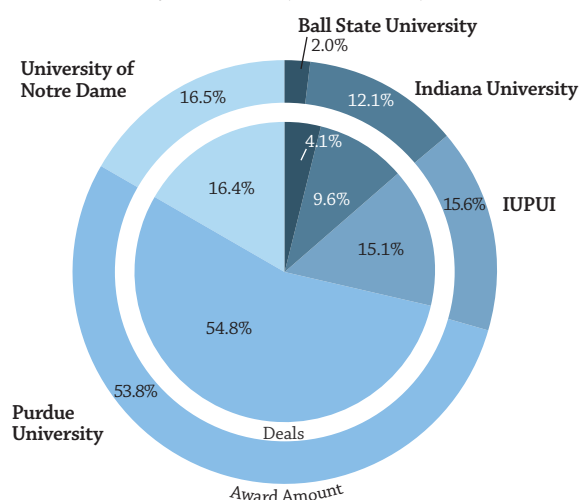




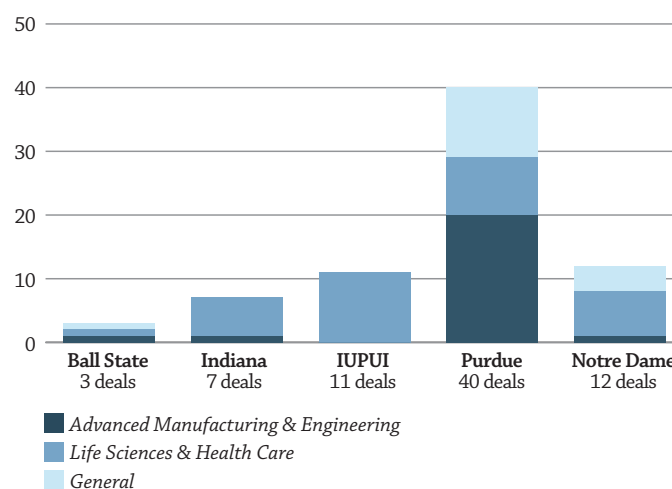
## University Collaborations

21st Century Funds have long collaborated with researchers from the state's leading academic institutions. This is evident by looking at the number of deals (73 awards) including centers of excellence, received by various universities in Indiana. More than half of these university awards were received by Purdue University, largely in the field of advance manufacturing/engineering, for which they enjoy a strong international reputation.

**Figure 9: Share of Awards by University**



**Figure 10: Percent Share of Deals by University**



## Reported Job Creation

The 21st Century Fund is, at its core, an economic development tool. While the Fund has targeted long term improvements in Indiana's economy by fostering high technology and innovation, the number of jobs created directly by the funding mechanism is an useful indicator of the short term economic benefits of the program. In order to examine this effect here we rely on the reported number of jobs created by the Fund recipients. This is historical data (not projections) reporting actual employment by each firm. That data for rounds 7 through 10 appears in Table 3.

This type of data however, suffers some well known limitations. The most problematic is that we cannot assign with certainty causation of these jobs to the Fund's participation in financing the venture. We cannot determine the number of these jobs would have been created if the Fund were not available. This is a problem shared by economic development organizations across the world, and affects reporting of financing across the spectrum from the Community Reinvestment Act through microfinance programs internationally. However, the data reported here are actual reported jobs created, not those projected, and is therefore among the stronger of the job creation data provided directly by similar organizations. We note that the bulk of job creation has occurred in the state economic development focus areas.

**Table 3: Jobs Created by Indiana Awardees, Rounds 7 to 10**

Industry	Jobs Created
Advanced Manufacturing/Engineering	99
Information Technology/Software Development	318
Life Sciences/Health Care	275
Communications/Electronics	3
Energy/Environment/Agriculture	31
Aerospace/Defense/Security	35
<b>Total</b>	<b>761</b>

# Effectiveness of Reviewer Process

We examined the review process of proposals in Round 6. Twelve funded projects<sup>2</sup> were awarded in that round. There were 16 reviewers evaluating 127 proposals in each review stage (primary and secondary). On average, each of the reviewers reviewed 8 proposals in each stage. The award outcomes<sup>3</sup> of the reviewers witnessed a range between zero and 23% for both the stages. The acceptance rate of 21st Century Funds reviews for this round was 9.4% (i.e., 12 awards/127 proposals), which is well within the acceptance rate limits (6 to 10%) of many commendable academic journals in economics, finance, psychology, marketing, computer science, and business information systems.

We also examined the reviewer process as a secondary check of the efficacy of the business related reviews. To do so, we performed a series of statistical tests to gauge whether or not reported job creation, expected job creation, the difference between actual and expected jobs or the share of expected jobs created were correlated with rankings on the review process. The purpose of this secondary check was to ascertain whether or not individual elements of the business plan review provided distinct information about the pending success of the project. Each ranking of the business plan was graded, so we translated these into traditional grade numerical scores for funded projects. The categories we included from the business plan were management and marketing access, capital access, executive support, overall project support and technology readiness. We note without further analysis that establishing clear criterion for these metrics are difficult, and that with a 40 year history NASA still struggles with technology readiness metrics.

For brevity we do not report the several statistical models in this report, but note that with the exception of the actual jobs created rankings, none of the models enjoyed acceptable levels of statistical meaning. That means that among the projects Funded, no single factor was correlated with job projections or the difference between job projections and actual created jobs. This is good news as it suggests there is not a ‘bias’ in one particular metric that would lead to selection of firms based on their job projections. However, we do find that the metrics on market access and capital access are positively correlated with total jobs created, while the project support metric is weakly and negatively related to total jobs created. Overall, these findings provide tentative evidence that the business evaluation of projects is strong.

Table 4: Descriptive Statistics of Reviewer Process for R6

	Primary		Secondary		Total	
	Reviews	Awards	Reviews	Awards	Reviews	Awards
Total	127	12	127	12	154	24
Average	7.94	0.75	7.94	0.75	15.88	1.5
Minimum	5	0	5	0	13	0
Standard Deviation	1.65	0.68	1.95	0.86	1.78	0.97
Number of Reviewers	16					



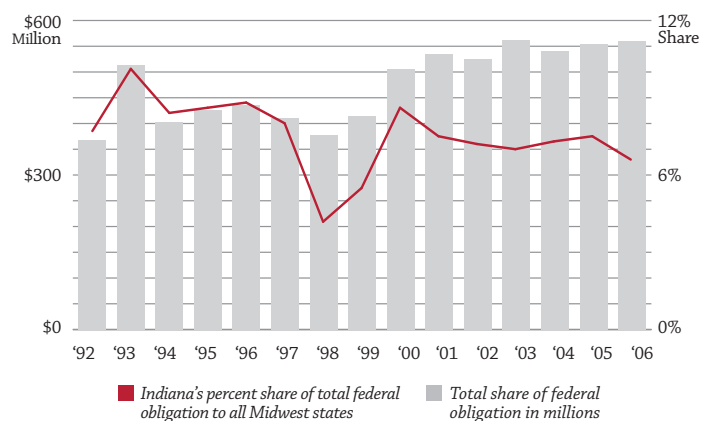
## Changes to R&D Efforts

### Federal Obligation to State by Agency

Between 1992 and 2006, the federal obligation for research and development to Indiana had been in the range of 0.52% to 0.78% of the total obligation to all states. Compared to the year 1999, there was an increase in the federal obligation to Indiana by 22.3% in 2000, when the total nation's federal obligation fell by 3.4% during the same period. Coincidentally, the Indiana 21st Century Fund was established during this period, validating its impact on the federal obligation to the state. The federal obligation to Indiana stayed at the same level through 2006 at \$559.8 million.

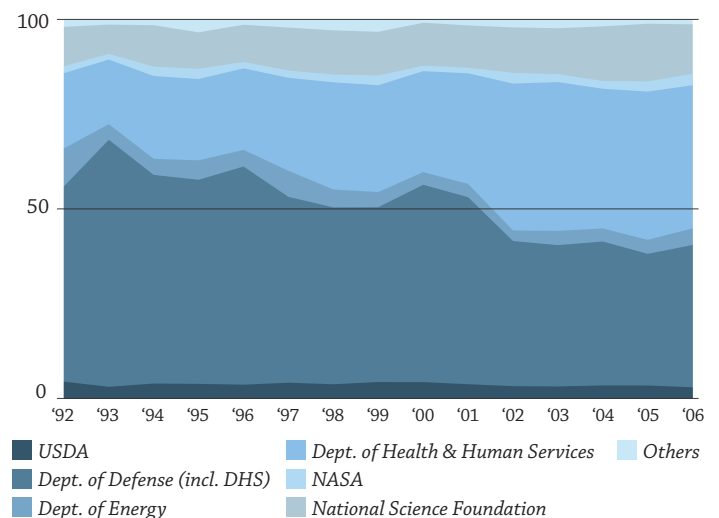
Figure 12 shows the federal obligation for research and development to Indiana by agency. It can be noted that between 1992 and 2006 an increase of percentage share of federal obligation was seen among Department of Health and Human Services, NASA and National Science Foundation, whereas the obligation by Department of Defense decreased during the same period. From 1997, the percentage share of obligation for most agencies stayed at the same level.

**Figure 11: Total Federal Obligation to Indiana, 1992-2006**



Note: Midwest states include IN, IL, MI, MN, OH, WI. Source: National Science Foundation

**Figure 12: Percent Share of Federal Obligation by Agency, 1992-2006**



Source: National Science Foundation

## SBIR/STTR Award Contribution by Agency

There were 336 awards given to Indiana from selected agencies through SBIR/STTR from 2003 to 2008. Out of these awards, 21st Century Funds had participated in matching funds for 248 (74%) of these award recipients. This strongly substantiates the effectiveness of 21st Century's Funds matching program aimed at bringing more SBIR/STTR grants to the state. Table 5 shows the comparison between the number of SBIR/STTR awards by agency and 21st Century Fund's SBIR/STTR awards by agency. Indiana received highest number of SBIR/STTR awards from Department of Defense (46%), followed by National Institute of Health (33%), National Science Foundation (9%), NASA (5%), U.S. Department of Agriculture (4%) and Department of Energy (3%).

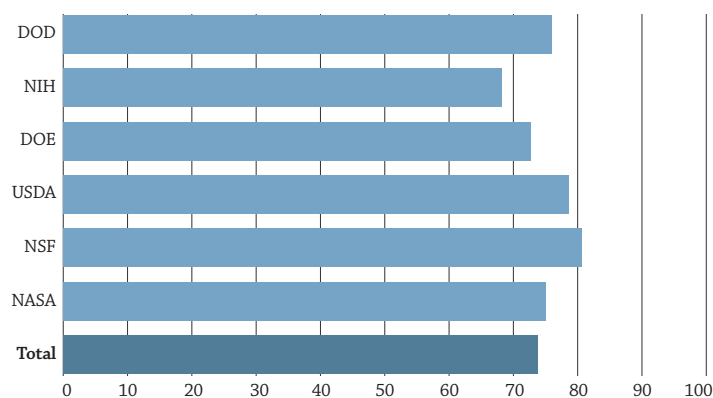
Figure 13 displays the percentage share of 21st Century Funds contribution on total number of SBIR/STTR awards received in Indiana from 2003 to 2008 for selected agencies. This percentage share was highest among National Science Foundation projects (81%) and the percentage share among other agencies were between 68% to 79%.

**Table 5: Total SBIR/STTR Awards by Agency and 21st Century Fund's Contribution, 2003-2008**

Agency	Total Indiana SBIR/STTR Agency Awards	21st Century Fund's SBIR/STTR Awards
Department of Defense (DOD)	154	117
National Institutes of Health (NIH)	110	75
National Science Foundation (NSF)	11	8
National Aeronautics and Space Administration (NASA)	14	11
United States Department of Agriculture (USDA)	31	25
Department of Energy (DOE)	16	12
<b>Total</b>	<b>336</b>	<b>248</b>

Source: SBIR/STTR awards from respective federal agency website.

**Figure 13: 21st Century Fund Contribution to Total SBIR/STTR Awards by Agency, 2003-2008**

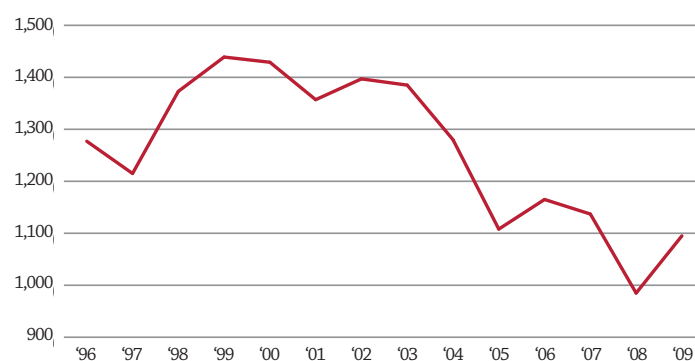


Source: SBIR/STTR awards from respective federal agency website.

## Number of Patents

Though the number of patents received by Indiana peaked between 1998 and 2003, the trend declined steadily from then until 2009. Also, the percentage share of Indiana's patents to the total patents received in United States decreased gradually from 2.1% (in 1996) to 1.3% (in 2009).

**Figure 14: Indiana Patent Trends, 1996-2009**



Source: United State Patent and Trademark Office (USPTO)

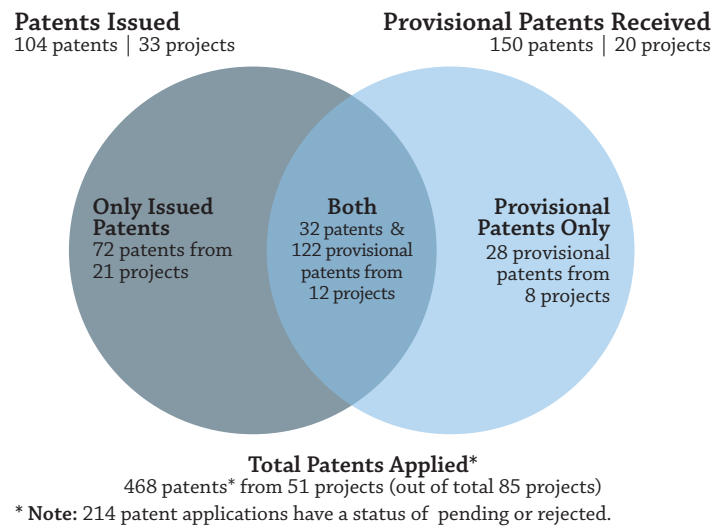
## The 21st Century Fund R&D Outcomes

Since 2005 (rounds 7-10), 85 projects were awarded by the 21st Century Fund to various firms. Out of these projects, 22% created new IP agreements, 20% generated invention disclosures, 60% filed patent applications, 39% received patents and 24% received provisional patents.<sup>4</sup> The status of patents from round 7 through 10 is shown in Table 6. Figure 15 shows a breakdown of these patents.

**Table 6: Projected R&D Outcomes of 85 Projects, Rounds 7-10**

Outcome	No. of Projects Contributed	Percent of Total Projects
New IP Agreements	19	22.35%
Invention Disclosure	17	20.00%
Patent Applications	51	60.00%
Issued Patents	33	38.85%
Provisional Patents	20	23.53%

**Figure 15: Patent Status, Rounds 7-10**

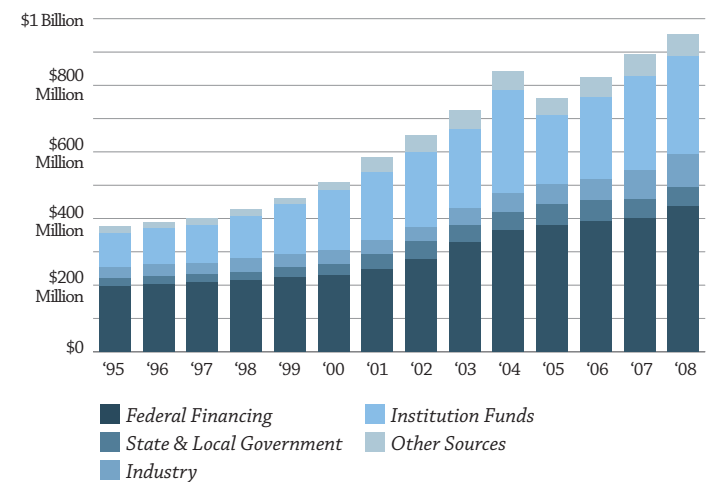


## Academic R&D Expenditures in Science and Engineering in Indiana

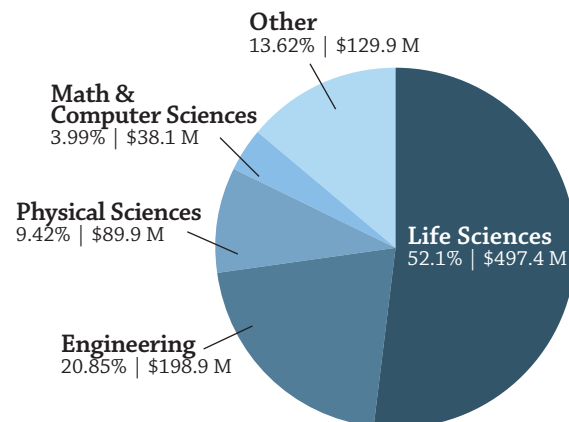
Academic R&D expenditures in Indiana have increased by 154% from 1995 to 2008. In 2008, federally financed expenditure was \$436.2 mil (increase of 120%), state and local government expenditure was \$58.6 mil (increase of 161%), industry expenditure being \$98.9 mil (increase of 186%), and institution funds with \$292.1 mil (increase of 188%). Figure 16 shows the trend of the academic R&D expenditures by the source from 1995 to 2008. After the year 1999, the trend increased exponentially, possibly due to the 21st Century Funds impact on the R&D expenditures

Figure 17 shows the breakdown of the total university R&D expenditures in Indiana by science and engineering fields in 2008. The life sciences field received 52% of the total expenditures,

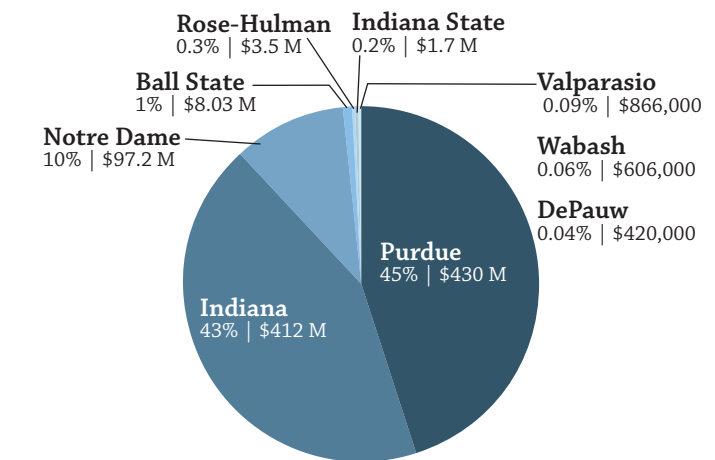
**Figure 16: Indiana's Total Academic R&D Expenditures**



**Figure 17: University R&D Expenditure by Science and Engineering, 2008**



**Figure 18: University R&D Expenditures in Indiana, 2008**



Source: National Science Foundation - [http://www.nsf.gov/statistics/nsf10311/content.cfm?pub\\_id=3944&id=2](http://www.nsf.gov/statistics/nsf10311/content.cfm?pub_id=3944&id=2)

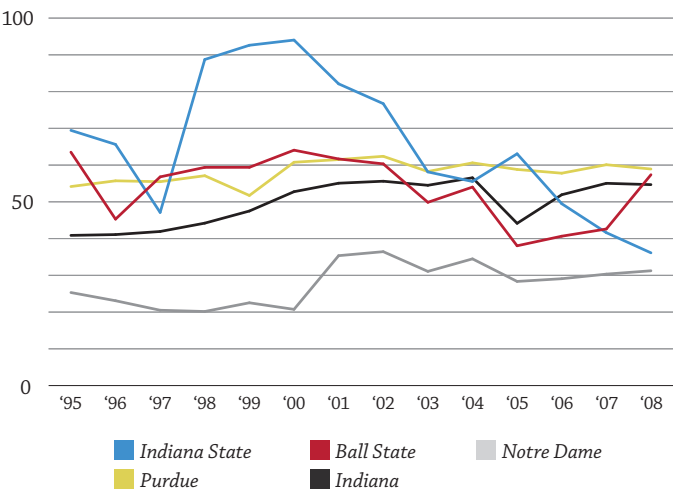


followed by engineering (20.9%), physical sciences (9.4%), math and computer science (4%) and others (13.6%). This reflects the correlation with 21st Century Funds award amount to sectors such as life science/health care (49% of award amount), and advance manufacturing/engineering (20.4%).

Figure 18 displays the academic R&D expenditures in science and engineering fields for Indiana’s public and private universities in 2008. Purdue University and Indiana University had the highest total R&D expenditures with 45% and 43% respectively, followed by University of Notre Dame (10%).

Almost all of the public universities have relied on non-federal dollars for their research in science and engineering fields. This is evident in the percentage share of non-federal academic expenditure to the total academic expenditure from 1995 to 2008 (see Figure 19). Of all the universities, Purdue University, Ball State University and Indiana University have counted on more than 50% of their total expenditures on non-federal dollars for R&D.

**Figure 19: Percent Share of Non-Federal Academic Expenditures by University, 1995-2008**

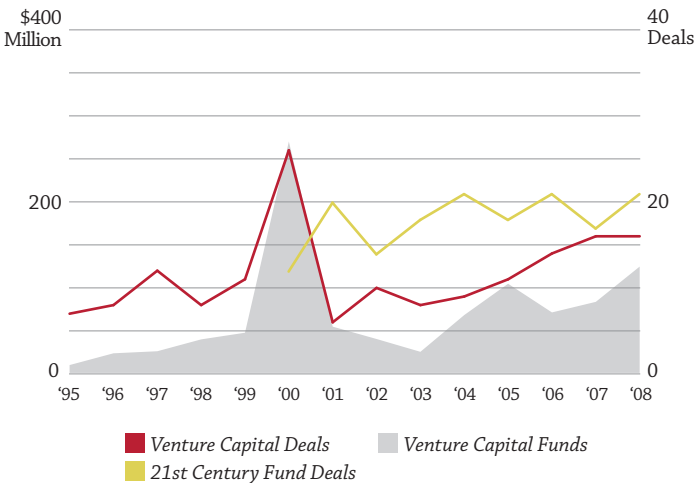


**Source:** National Science Foundation - [http://www.nsf.gov/statistics/nsf10311/content.cfm?pub\\_id=3944&id=2](http://www.nsf.gov/statistics/nsf10311/content.cfm?pub_id=3944&id=2)

## Venture Capital Deals — Effects of The 21st Century Fund

Figure 20 displays the venture capital dollars and deals from 1995 to 2008 along with the number of 21st Century awards from the year 2000. The 21st Century award contribution in terms of number of deals outperformed the venture capital deals for most of the years. Also, there has been an increase in venture capital dollars since 1999.

**Figure 20: 21st Century Fund Effect on Venture Capital**



**Source:** State Science and Technology Institute - <http://www.ssti.org/vc/indiana/all.php>

**Primary Source:** PricewaterhouseCoopers/National Venture Capital Association Money Tree Report

**Data:** Thomson Financial

# Changes to Industrial Sector

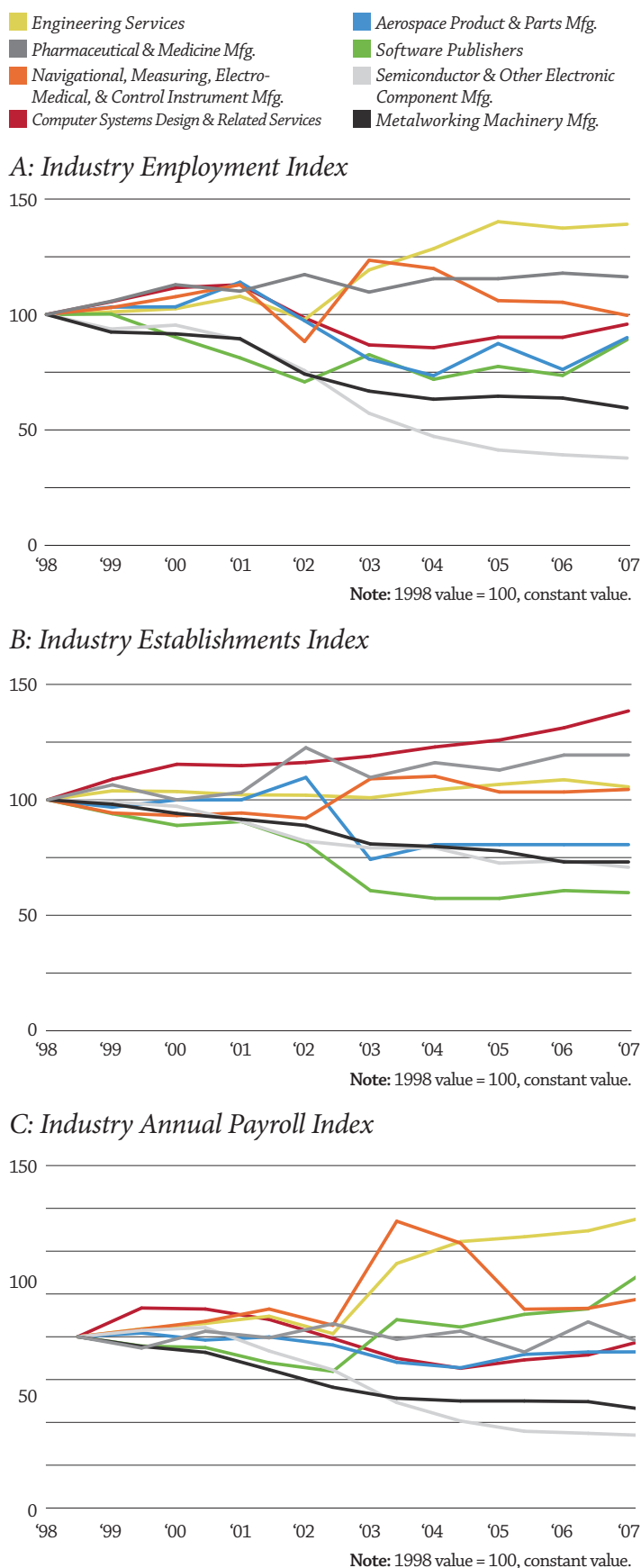
## Trends for Selected Industry Sectors

The 21st Century Fund has been investing in diversified projects in areas such as life sciences/ health care, advanced manufacturing/ engineering, information technology/ software development, communications/ electronics, energy/environment/agriculture, and aerospace/defense/security fields. It is important to see how the industry, specific to these fields have performed over a period of time.

Figure 21 displays the trend indexes for employment, establishments, and annual payroll <sup>5</sup> for various industry sectors from 1998 to 2007. Engineering service industry experienced high growth from 1998 in employment (up by 39% as on 2007), establishments (up 6%), and annual payroll (up 71%). Though the annual payroll for pharmaceutical and medicine manufacturing industry had declined by 6% between 1998 and 2007, the employment and establishment index reflected an increase of 16% and 19% respectively during the same period. Computer systems design and related services sector showed a steady increase of 39% in number of establishments. Navigational, measuring, electro-medical, and control instruments manufacturing sector demonstrated a slight increase in establishments (up 5%) and huge growth in annual payroll (up 23%). This coincides with the industries targeted by 21st Century Funds while awarding projects.

Semiconductor and other electronic component manufacturing sector declined drastically in employment (down 62%), establishments (down 29%) and annual payroll (down 58%) between 1998 and 2007. Metalworking machinery manufacturing followed similar trend with 40% decline in employment, 27% in establishments and 43% in annual payroll. Though software publishers experienced large decreases in employment (down 11%) and establishments (down 40%), the annual payroll was increased by 41%. Aerospace product and parts manufacturing sector also displayed declining trends for all the three variables.

**Figure 21: Trend Indexes**



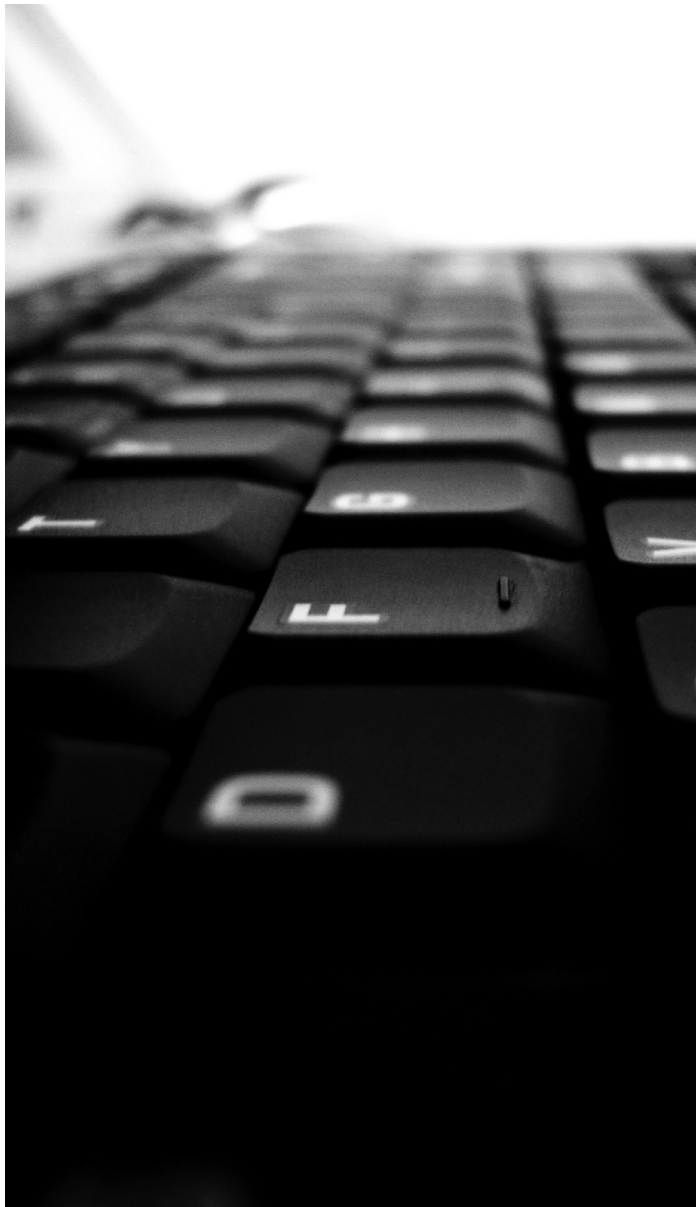
Source: County Business Patterns - <http://www.census.gov/econ/cbp/>

## Policy Connections

State venture capital funds such as the 21st Century Fund are not new, and have been in existence since the late 1970s. During the ensuing period economists have undertaken considerable analysis of such programs as part of their efforts to understand both individual and comprehensive economic development plans. These findings provide an important window on the role of the 21st Century Fund on Indiana's economy.

The first major study of state venture capital funds examined 13 different funds with an emphasis on Massachusetts Technology Development Corporation (MTDC), which had been in operation a decade (Fisher, 1988). The author is perhaps the best known analyst of state economic development policies in the U.S. This study performed a simulation of the investment return of the projects, finding that the net public benefit exceeded public cost after 16 years of operation. Importantly, this study only examined the direct public investment, not the leverage of additional venture capital funding. This study also reported job creation effects, concluding that state venture capital funds are "likely to make some contribution to the development of the technology-oriented sector of the state economy. But, given the size of such funds, they will not make a major contribution." (Fisher, 1988 p 175). He goes on to report that during the first five years of the fund, companies receiving the fund totaled 1,200 employees. This is comparable to the magnitude of the investments made by the 21st Century Fund in recent years, and so these are reasonable comparisons of impacts. Fisher also addresses the role of state government in this type of economic development effort. His study of Massachusetts reports that state government VC funds have different investment goals, are less focused on short term profitability (have longer time horizons), lower risk tolerance and lower required rates of return. He also notes that private sector VC firms probably cherry pick projects, leaving smaller investments for the state funds. Fisher also made substantial recommendations to alter the focus of the MTDC to incorporate broader considerations such as job quality, enhancements to long term state growth, or the effect of the investment on reducing market shocks on the state economy. Hood (2000) makes a similar argument on the diverse goals of governmental VC funds.

Lelux and Surlemont (2003) examined the role of public sector venture capital funds on private sector VC. This study was prompted by concerns that public sector interventions 'crowd out' private sector investment. The authors reject the crowd out hypothesis, and find that at the industry level, government sponsored VC tends to promote greater levels of private sector VC.







They argue that the signaling effect of public sector VC generates private sector interest, and that the certification of public involvement also plays a role in boosting private sector participation. Hood (2000) made a similar argument in a social context, that the presence of VC was critical to the development of high technology firms in small geographic areas.

Lerner (2002) broadly examined the role of public sector capital provision. This broad paper by the leading academic analyst of venture capital yields several important insights. The first is the extreme difficulty the 21st Century Fund experiences in selecting projects. He uses as an example the first modern VC firm's experience, which was formed at Harvard in 1946. In roughly the first thirty years of this firm's existence, half of all profits came from one modest investment. He thus makes several important observations about program design. He argues that public investment officials must be fully versed in the US venture capital industry. He commends a narrow technological focus and process flexibility. This flexibility is especially important with respect to changes in the most uncertain levels of the market should be part of the post award process. He warns that the entrepreneurial track record of recipients be scrutinized, and the "SBIR Mills" be avoided (that is underperforming firms with much grant activity across different agencies). Clear track records are important parts of the evaluation of a firm's legitimacy. Lerner also addresses more fundamental issues of state sponsored venture capital funds. He argues like Lelux and Surlemenot (2003) that the certification and signaling of a company by state VC provides an important insight to private VC firms. This would tend to increase private VC funding. He also argues that R&D spillovers are important considerations for regions considering public sponsored VC. He

does caution that the 'capture' of public VC by interest groups poses a particular problem, and limits the effectiveness of the program.

These major studies appear in peer reviewed literature, and represent the most comprehensive analysis of state venture capital funding. We briefly note that the administration of the 21st Century Fund appears to place significant focus on understanding a narrow set of technologies, focuses on both the technology and business elements of prospective firms, and has otherwise adopted, over time, the best practices outlined by these researchers.

It is important also to understand the larger landscape against which Indiana participates in venture capital funding. Nationally, more than \$2.3 billion in state venture capital funds are distributed across 30 states. Indiana has roughly 2.9 percent of these funds. Associated with these funds are venture capital tax credits in more than 16 states, and an associated network of 140 angel investment groups (two are located in Indiana). See Table 7 as follows.

**Table 7: State Venture and Angel Investor Policies and Networks**

State	Investment Capital in Millions	Name of Fund(s)	Year Authorized (Year Began)	Tax Credit	Angel Group Name
Arkansas	47.6	Seed Capital Investing Program Arkansas Institutional Fund	1985 (1986) 2001 (2003)		Fund for Arkansas' Future
Arizona				Angel Investment Tax Credit	Arizona Angels AZTE Angels Desert Angels
Colorado	23	Venture Capital Authority Fund of Funds	2004 (2005)		CTEK Angels Transition Partners Ltd
Connecticut	60	Eli Whitney Fund, Bio-Seed Fund, Seed Fund, Biotech Facilities	1989 (1995-2007)		Angel Investor Forum Golden Seeds
Delaware	8	Venture Capital Program Emerging Tech. Pre-Venture Fund	2005 2007 (2006)		
Florida	29.5	Florida Opportunity Fund	2007		Emergent Growth Fund New World Angels Inc South Florida Angel Fund Springboard Capital Startup Florida Ventures Inc.
Georgia	18	Seed Capital Fund of Georgia	1988 (2000)		Ariel Savannah Angel Partners Atlanta Technology Angels
Hawaii	31	Hawaii Strategic Development Corporation	1990 (1995)	High Technology Investment Tax Credit	UH Angels
Illinois	83.5	Finance Authority Technology Development Bridge  Illinois Equity Fund-Angel & Seed Fund  Technology Development Account	1983 (1984)  2006 (2006)  2002 (2004)		BioAngels Bluestem Ventures DePaul Blue Angel Network EMME Angel Group Heartland Angels Northern Illinois Angels Prairie Angels Southern Illinois Angels Stateline Angels Inc.
Indiana	70	The 21st Century Research & Technology Fund	1999 (2000)	Venture Capital Investment Tax Credit	Indiana Seed Fund Irish Angels
Iowa	100	Iowa Fund of Funds	2005 (2005)	Qualified Business Investment & Seed Capital Tax Credit	
Kansas	7.4	KTEC Seed Fund	1987 (2000)	Angel Investor Tax Credit	Mid-America Angels Midwest Venture Alliance
Kentucky	46	Commonwealth Seed Capital Fund KSTC Enterprise Fund	2001 (2001) 2000 (2002)		Bluegrass Angels
Louisiana	38	Venture Capital Match Program	1989 (1989)	Angel Investor Tax Credit	Louisiana Angel Network
Maine	12	Small Enterprise Growth Fund Venture Capital Revolving Investing Prgm.	1996 (1997) 2000 (2000)	Investment & Seed Capital Tax Credit	Maine Angels
Maryland	30	Maryland Venture Fund TEDCO Fund	1994 (1994) 1998 (2002)	Angel Investor Tax Credit	Chesapeake Emerging Opportunities Club Maryland Angels Council
Massachusetts	35	Mass. Technology Development Corp.	1978 (1979)		Angel Healthcare Investors Bay Angels-Boston CommonAngels HubAngels Investment Group Investors Circle Launchpad Venture Group River Valley Investors Walnut Venture Associates
Michigan	204	21st Century Jobs Fund Venture Michigan Fund	2006 (2007)	Angel Investor Tax Credit	Ann Arbor Angels Aurora Angels Grand Angels Great Lakes Angels
Minnesota	16	RAIN Source Capital	1998 (1998)		
New Jersey	65	Edison Innovation Funds	2006 (2006)	High Technology Investment Tax Credit	Jumpstart New Jersey Angel Network Silicon Garden Angels & Investors Network

New Mexico	536	NMIC Direct Investment Program NMIC Fund of Funds	2003 (2004) 1994 (1995)	Angel Investment Credit	New Mexico Private Investors
New York	20	Small Business Technology Investment Fund	1981 (1982)		Central New York Angels New York Angels Orange County Angel Network Rochester Angel Network Tech Valley Angel Network Tri-State Private Investors Network TriState Ventures
North Carolina				Qualified Business Investment Tax Credit	Blue Angel Ventures Blue Ridge Angel Investor Network Charlotte Angel Partners Inception Micro Angel Fund Piedmont Angel Network Triangle Accredited Capital Forum Tri-State Investors Group Wilmington Investor Network
North Dakota	43	North Dakota Development Fund New Venture Capital Fund	1991 (1991) 2003 (2003)	Seed Capital & Investment Tax Credit	
Ohio	212	Ohio Capital Fund Third Frontier Pre-Seed Fund Initiative	2005 (2005) 2002 (2003)	Technology Investment Tax Credit	C-Cap/Queen City Angels CoreNetwork NCIC Capital Funds Ohio TechAngels Fund
Oklahoma	107.2	OCAST Seed Capital Fund Oklahoma Capital Investment Board	1989 (2007) 1991 (1993)	Small Business Capital Credit	Enterprise Oklahoma Venture Fund
Oregon				University Venture Capital Funds	Portland Angel Network Women's Investment Network
Pennsylvania	68	Ben Franklin (BTDA) Venture Invest. Prgm. New PA Venture Capital Investment Prgm.	2000 (2000) 2005 (2006)		BlueTree Allied Angels Central Pennsylvania Angel Network Lancaster Angel Network LORE Associates Mid-Atlantic Angel Group Fund Minority Angel Investor Network Private Investors Forum Robin Hood Ventures Southwest Pennsylvania Angel Network Women's Investment Network
Rhode Island	7	Slater Technology Fund	1997 (1997)		Cherrystone Angel Group
South Carolina	48	South Carolina Venture Capital Fund	2007 (2007)		Charleston Angel Partners Columbia Angel Partners Hilton Head Angel Partners SCP Capital
Tennessee					Nashville Capital Network The Guardians of Innovation Valley Tri-Cities Regional Angel Investor Network
Texas	290	Emerging Technology	2005 (2005)		Camino Real Angels Houston Angel Network North Dallas Investment Group San Antonia Angels Technology Tree Group Texas Women Ventures Fund
Utah	106	UTFC Utah Fund of Funds	1984 (1986) 2003 (2006)		Top of Utah Angels Utah Angels
Vermont				Seed Capital Fund	North County Angels
Virginia	9	CIT Gap Fund	2003 (2004)	Qualified Business Investment Credit	Virginia Active Angel Network
West Virginia				High Growth Business Investment Tax Credit	Alliance of Angles Bellingham Angel Group Delta Angel Group Seraph Capital Forum
Wisconsin				Angel Investor Tax Credit	Chippewa Valley Angel Investors Network Marquette University Golden Angels Network NEW Capital Fund Origin Investment Group Phenomenelle Angels Silicon Pastures Wisconsin Investment Partners

**Source:** National Association of Seed & Venture Funds (NASVF), March 2008 & NGA Center for Best Practice Issue Brief, February 2008

## Aggregate Effects

The purpose of state venture capital funds in general, and Indiana's 21st Century Fund in particular is to stimulate innovation within the state and its institutions. The intent is then to facilitate spillovers of high technology employment and the economic benefit of these jobs over a long time horizon. While it is too early to fully assess this impact, we can assess the short- and medium- term job creation effects of the fund and the ensuing aggregate effects on the state's economy. The most common approach to perform this assessment is to empirically evaluate the impact of the Fund. Broadly speaking there are two potential techniques available for assessing the 21st Century Fund performance in these areas. In one case, a long history of Fund efforts is compared to the actual record of economic activity: jobs, wages and business establishments. The second is to employ a regional model of economic activity to simulate the effect of the Fund. Because of the paucity of observations, we are not able to perform the historical evaluation. In order for us to conduct this assessment we will require more years of funding, or considerably more geographic distribution of recipients. This limitation is a purely technical limitation of sample size, which nevertheless forces us to choose the second option: using a regional simulation model.

In order to assess the 21st Century Fund on Indiana's economy, we use the well known regional impact model by REMI, Inc., which is operated by the Center for Business and Economic Research. This model permits us to simulate a variety of economic changes on Indiana's economy.

Our simulation consists of an evaluation of the first seven rounds, from 1999-2000 through 2005-7 (a dual year round). We limit the analysis to these years because the more recent years of funding are too recent to fully account for the economic adjustments and therefore cannot be assessed with the model. We focus on key economic variables: total and private sector employment, state Gross Domestic Product, incomes and population changes.

To simulate these impacts we must assign the public finance effects, both through expenditures and their opportunity costs. To do this we first estimated the total investment from the 21st Century Fund, and all Venture Capital leveraged funds that were reported to the Fund. To include the opportunity cost of the Fund as part of the economic impacts, we reduced expenditures by Indiana state government by the amount of the annual Fund awards. We also included a three percent administrative cost for management of the Fund separately from other state administrative and policy functions.

The REMI, Inc. regional economic model provides a dynamic general equilibrium model to account for the impact of these expenditure shifts. The net effects estimated by this process are primarily driven by productivity differences between the sectors receiving the investment and the value of the leveraged venture capital funds.

Our simulation finds that over the first seven rounds the 21st Century Funds have boosted private sector employment by roughly 11,132 jobs over this time period, over what it would have otherwise been. It is important to note that some of this total job creation has been offset by lower state employment during this period, a necessary opportunity cost of the Funds operations. The cost per private sector job is roughly \$14,000 per job year in initial funding. Though the Fund was not designed to boost short- to medium-term job creation, this cost is only slightly higher than the most effective job creation incentives found in the economic literature. Total state GDP was boosted by \$427 million over this period with real disposable personal income growing by \$315 million. Our simulation results also account for population changes resulting from this level of state expenditure and leveraged private venture capital. The model suggests that this boosted state population by a little more than 3,000 persons over this period.

The results of this simulation hearken back to much of the formal research on state venture capital funds. The broadest conclusion mentioned above is that while states can effectively operate such funds, they are not likely to make broad contributions to economic development efforts due to their size and scope (see Fisher, 1988).

**Table 8: *Economic Effects of The 21st Century Fund***

Round	1	2	3	4	5	6	7	Total 1999-2007
Change in Private Non-Farm Employment	463	1,716	1,348	1,582	2,648	1,729	1,646	11,132
Cost per private sector job	30,233	13,559	10,924	15,720	12,202	12,966	15,766	14,152
Real state GDP (\$millions)	12	65	54	58	105	70	63	427
Real Disposable Personal Income (\$million)	8	43	38	43	77	54	52	315
Population	15	194	314	412	643	718	762	3,058

# Recommendations

## Process

- While reviewing proposals from Indiana universities, it is recommended to bring reviewers from other states in order to avoid a conflict of interest.
- Track number of jobs created/retained from all the awarded projects 5 years after project completion date.
- Conduct workshops and training to improve efforts for filing patents and intellectual property rights.
- Greater transparency of Fund goals would likely attract a more appropriate investment pool so a clearer statement of purpose should be provided on the Fund website.

## Policy Recommendations

- Firms that do not receive funding support may be fertile ground for later applications. Robust feedback and connections between the nascent potential investments and the Fund may be a source of ongoing opportunities for Indiana.
- Post investment support of entrepreneurial activities should be considered a prime area of Fund focus. This should include not only management assistance (or talent acquisition) but also more mundane matters as legal and regulatory assistance.
- Successful Fund participants should be subject to post commercialization review by a team of business historians/ anthropologists or management experts to understand

what aspects of success may be supported in other firms.

- 21st Fund companies should receive 'fast track' integration with suite of economic development policies (especially workforce training).
- University commercialization efforts should be more fully leveraged towards a pipeline of 21st Century Fund applicants.
- Clear communication of the Fund's intent, long lead times and the frequency of post-award changes to business plans should be carefully and frequently communicated to stakeholders across Indiana.

## Recommended Future Metrics

- Percent share of jobs created by Fund awarded projects to the total jobs by industry sector in Indiana each year.
- Number of patents received by 21st Century Fund's awarded project vs. total patents received for Indiana each year.
- Compare reviewer checklist (prepared by the Center for Business and Economic Research) for all the proposals and then statistically compare awardees and non-awardees for every round.
- Number of university based start-up companies per year
- University licensing income trend.

# Database

**Table 9: Recommendations for the Database**

#	Recommendations	Benefits to the 21st Century Fund
1	Keep to a fixed quarterly reporting period of project status - January 1 to March 31, April 1 to June 30, July 1 to September 30 and October 1 to December 31. The principal investigators have to submit the report within 15 days from the end of each quarter.	Consistent timeframe could help the Fund analyze the performance across various projects at the same time. Follow-up calls also could be made simultaneously to those who missed the reporting deadline.
2	Incorporate an "Export to spreadsheet" option for all the projects in the database	Helps to keep track of individual projects in one spreadsheet
3	Provide unique numbers to the awarded projects each year by sector. For example: R011LS0002 , where R011 - Round 11, LS - Life Science sector, 0002 - second award in Round 11 under Life Science category)	These unique numbers could help the Fund to identify projects by sector and examine the sector's performance.
4	Option to sort database by project, round, award number, principal investigator, sector, etc.	Fund could improve usability in the existing database.
5	Provision for <i>current quarter</i> and <i>cumulative</i> numbers for all variables except personnel, in order to avoid duplication in the following quarter. For example, if a project has received two patents in first quarter 2011, the PI would report this receipt in their quarterly report due on April 15. Suppose, in the third quarter 2010, the same project received additional three patents, the PI would report this additional number in the quarterly report due on October 15. The cumulative number column for this project would show a total number of five patents.	21st Century Funds could analyze the quarter and overall status of the project distinctly.
6	The completed projects can be removed from the <i>Quarterly Reports</i> database page to another link named as <i>Archive</i> at the top of the page.	This would help 21st Century Funds to focus on on-going project, thereby reducing the scroll-down time of the page.

# Reviewer Checklist

**Table 10: The 21st Century Fund Reviewer Checklist**

Scientific Impact Rating Parameters (on a scale of 1 to 5; 1=low & 5=high)	
<b>Background</b>	
1	Good infrastructure
2	Strong track record
3	Suitability of facilities
4	Enhancement of Indiana R&D infrastructure
5	Awareness of business development and marketing
6	Good experience in the field
7	Availability of experts in-house
8	Stronger in identifying products
9	Significant genuine collaboration among private and public institutions
<b>Product Potentials</b>	
1	Huge market potential
2	Good for Indiana (last long within state)
3	Potential economic impact
4	Products (idea) with good potential
<b>About the Proposal</b>	
1	Strong science
2	Good reliable commercialization
3	Good technology transfer
4	Good business plan
5	Well defined milestones and objectives
6	In-house project
7	Good focus
8	Good proposed studies/publications
9	Have letter of support from University or Intellectual property
10	No issues with security and privacy
11	Excellent data availability
12	Remarkable prototype results
13	No compliance issues
14	Highly qualified principal investigator
15	Principal Investigator forefront in the field
16	Good participation during proposals
<b>Cost Factors</b>	
1	Reasonable budget
2	Reasonable cost-sharing
3	Good factual financial leveraging
4	Good Intellectual or infrastructural leveraging
5	No issues with flow of funds
6	Have matching funds (if applicable)
<b>Other Factors</b>	
1	Not redundant with other good proposals
2	Not recycled projects (Not an extension of current work)



## Future Research

It would be helpful to 21st Century Funds to test whether the personality traits of principal investigators (awarded and not-awarded) and reviewers have any impact while determining the award outcomes for each round. Also, evaluating the performance of projects that were not awarded by 21st Century Funds could be used to determine the effectiveness of review system.

- Longitudinal study of Fund recipients/non-recipients would provide an opportunity to assess the role of the 21st Century Fund in commercialization in a setting more closely approximating a controlled experimental setting. This would provide both policy and management insight for the Fund
- Formal updates of the 2000 Battelle Study is needed (this study argued for life sciences, advanced manufacturing and IT as target industries for Indiana).

## Endnotes

1. Leverage ratio = Leveraged funds / 21st Century award amount
2. We have treated these 12 awards being recommended by all the reviewers, (who evaluated these award winning proposals) either during the primary or secondary stages.
3. Reviewer award outcomes = (# of Awards recommended by reviewer / # of Proposal reviewed by reviewer) \*100
4. Some projects had filed and received multiple patents.
5. Annual payroll numbers were adjusted for inflation with 1998 as the base year.

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# Appendices

**Table A1: Funded Projects by Round and Industry**

	Round										
	1	2	3	4	5	6	7	8	9	10	Total
<b>Number of Funded Projects</b>	<b>12</b>	<b>20</b>	<b>14</b>	<b>18</b>	<b>21</b>	<b>18</b>	<b>34</b>	<b>24</b>	<b>12</b>	<b>15</b>	<b>188</b>
Advanced Mfg. & Engineering	2	4	7	6	7	7	3	4	1	3	44
I.T. & Software Development	0	2	0	0	1	0	3	7	4	5	22
Life Sciences & Health Care	10	8	6	5	6	9	17	13	7	7	88
Communications & Electronics	0	4	0	4	1	2	3	0	0	0	14
Energy, Environment & Agriculture	0	1	1	3	1	0	4	0	0	0	10
Aerospace, Defense & Security	0	0	0	0	5	0	4	0	0	0	9
General	0	1	0	0	0	0	0	0	0	0	1

	Round										
	1	2	3	4	5	6	7	8	9	10	Total
<b>Award Amount (\$)</b>	<b>13,997,978</b>	<b>23,267,906</b>	<b>14,725,494</b>	<b>24,869,081</b>	<b>32,311,143</b>	<b>22,419,020</b>	<b>36,105,096</b>	<b>37,085,205</b>	<b>18,264,000</b>	<b>15,300,000</b>	<b>238,344,923</b>
Advanced Mfg. & Engineering	1,585,308	3,377,071	6,125,019	9,425,633	9,014,297	4,660,532	2,800,000	6,885,548	2,000,000	2,800,000	48,673,408
I.T. & Software Development		1,222,944			959,300		3,650,000	11,431,045	7,000,000	3,750,000	28,013,289
Life Sciences & Health Care	12,412,670	10,365,151	6,872,395	4,818,767	12,076,607	15,092,239	18,747,525	18,768,612	9,264,000	8,750,000	117,167,966
Communications & Electronics		4,703,365		7,171,657	1,922,056	2,666,249	2,953,254				19,416,581
Energy, Environment & Agriculture		2,000,000	1,728,080	3,453,024	873,756		4,436,423				12,491,283
Aerospace, Defense & Security					7,465,127		3,517,894				10,983,021
General		1,599,375									1,599,375

**Table A2: Funded Projects—Leverage Ratio**

Round	21st Century Awards (\$)	Leverage Ratio	Round	21st Century Awards (\$)	Leverage Ratio
1	13,997,978	0.80	6	22,419,020	2.49
2	23,267,906	2.34	7	36,105,096	1.44
3	14,725,494	2.91	8	37,085,205	1.08
4	24,869,081	1.97	9	18,264,000	2.06
5	32,311,143	2.63	10	15,300,000	0.54



**Table A3: Funded Projects by Recipients**

Number of Funded Projects				Award Amount (\$)		
Round	Total	University	Private	Total	University	Private
1	12	10	2	13,997,978	10,974,304	3,023,674
2	20	14	6	23,267,906	15,356,729	7,911,177
3	14	9	5	14,725,494	8,078,577	6,646,917
4	18	14	4	24,869,081	19,731,415	5,137,666
5	21	10	11	32,311,143	15,266,082	17,045,061
6	18	12	6	22,419,020	14,398,873	8,020,147
7	34	2	32	36,105,096	704,325	35,400,771
8	24	2	22	37,085,205	3,899,500	33,185,705
9	12	0	12	18,264,000		18,264,000
10	15	0	15	15,300,000		15,300,000
<b>Total</b>	<b>188</b>	<b>73</b>	<b>115</b>	<b>238,344,923</b>	<b>88,409,805</b>	<b>149,935,118</b>

**Table A4: Funded Projects by County**

County	Funded Projects	Award Amount (\$)	County	Funded Projects	Award Amount (\$)
Allen	8	11,301,108	Madison	5	6,640,932
Bartholomew	1	1,717,170	Marion	52	69,544,940
Boone	2	1,164,870	Monroe	8	11,513,758
Clay	1	350,000	Morgan	1	89,925
Dearborn	1	2,000,000	Porter	1	2,000,000
Delaware	3	1,793,807	Shelby	1	261,200
Floyd	2	3,826,774	St. Joseph	15	18,539,496
Hamilton	9	12,244,887	Tippecanoe	58	72,974,480
Hancock	1	730,000	Vigo	1	871,231
Howard	3	1,888,769	Whitley	3	4,000,000
Johnson	2	3,150,000	<b>Total</b>	<b>188</b>	<b>238,344,923</b>
Kosciusko	2	3,843,921			
Lake	8	7,897,655			

**Table A5: University Collaborations by Industry**

	Ball State	Indiana	IUPUI	Purdue	Notre Dame	Total
Advanced Mfg. & Engineering	1	1	0	20	1	23
I.T. & Software Development	0	0	0	2	0	2
Life Sciences & Health Care	1	6	11	9	7	34
Communications & Electronics	1	0	0	6	3	10
Energy, Environment & Agriculture	0	0	0	1	1	2
Aerospace, Defense & Security	0	0	0	2	0	2
<b>Total Award Amount</b>	<b>1,793,807</b>	<b>10,730,139</b>	<b>13,750,478</b>	<b>47,525,404</b>	<b>14,609,977</b>	<b>88,409,805</b>
<b>Total Funded Projects</b>	<b>3</b>	<b>7</b>	<b>11</b>	<b>40</b>	<b>12</b>	<b>73</b>

**Table A6: Federal Obligation to Indiana by Agency (in thousands of dollars)**

	Dept of Agriculture	Dept of Defense (incl DHS)	Dept of Energy	Dept of Health and Human Services	NASA	NSF	Others	Total
1992	16207	189005	36756	72962	6708	38132	7233	367003
1993	15647	334800	21156	87543	7790	39670	7041	513647
1994	15809	222148	17105	88241	10006	44094	6208	403611
1995	16342	229504	21849	91482	11447	40988	14580	426192
1996	15757	250648	19080	93707	7511	42649	6140	435492
1997	16956	201363	28212	100809	7872	46507	8927	410646
1998	14097	176279	17778	106863	7708	44117	10893	377735
1999	17845	190939	16533	116659	10689	47660	13539	413864
2000	21726	263699	16831	134987	7180	57472	4431	506326
2001	20018	263866	18639	156099	8036	59580	8440	534678
2002	16959	201345	14594	203789	14982	62943	11133	525745
2003	17706	209295	21063	220422	11801	67915	13036	561238
2004	18455	205544	18651	199448	11087	78045	9906	541136
2005	18811	192315	20347	216631	14952	84136	6424	553616
2006	16487	210152	24501	211463	16952	72988	7317	559860

Source: National Science Foundation - <http://www.nsf.gov/statistics/fedfunds/>

**Table A7 : Total Academic R&D Expenditures by Universities (in thousands of dollars)**

	Ball State	Indiana State (all campuses)	Indiana (all campuses)	Purdue (all campuses)	U. of Notre Dame	DePauw	Rose-Hulman	Valparaiso	Wabash
1995	\$ 2,248	\$ 1,208	\$ 145,512	\$ 203,419	\$ 23,332	\$ -	\$ 759	\$ 556	\$ -
1996	\$ 2,667	\$ 1,548	\$ 154,260	\$ 206,951	\$ 24,556	\$ -	\$ 851	\$ 426	\$ -
1997	\$ 3,076	\$ 1,265	\$ 165,198	\$ 206,588	\$ 24,116	\$ -	\$ 943	\$ 443	\$ -
1998	\$ 2,361	\$ 5,255	\$ 171,754	\$ 216,479	\$ 28,873	\$ -	\$ 1,035	\$ 571	\$ -
1999	\$ 2,056	\$ 4,977	\$ 194,790	\$ 226,411	\$ 30,483	\$ -	\$ 1,132	\$ 569	\$ -
2000	\$ 2,429	\$ 4,196	\$ 227,737	\$ 234,536	\$ 34,524	\$ -	\$ 4,994	\$ 725	\$ -
2001	\$ 3,071	\$ 1,504	\$ 259,899	\$ 254,917	\$ 46,096	\$ -	\$ 18,540	\$ 391	\$ -
2002	\$ 4,008	\$ 1,220	\$ 299,080	\$ 285,778	\$ 52,371	\$ -	\$ 7,912	\$ 349	\$ -
2003	\$ 3,878	\$ 1,369	\$ 337,669	\$ 309,476	\$ 59,803	\$ -	\$ 13,201	\$ 356	\$ -
2004	\$ 7,483	\$ 1,680	\$ 384,168	\$ 365,779	\$ 74,255	\$ 383	\$ 6,388	\$ 551	\$ 454
2005	\$ 8,490	\$ 1,473	\$ 307,137	\$ 364,986	\$ 71,266	\$ 404	\$ 4,914	\$ 488	\$ 464
2006	\$ 8,625	\$ 2,271	\$ 355,004	\$ 372,958	\$ 78,553	\$ 426	\$ 4,700	\$ 699	\$ 265
2007	\$ 7,913	\$ 1,697	\$ 386,654	\$ 415,172	\$ 77,467	\$ 426	\$ 3,271	\$ 763	\$ 445
2008	\$ 8,031	\$ 1,689	\$ 411,939	\$ 429,988	\$ 97,171	\$ 420	\$ 3,478	\$ 866	\$ 606

Source: National Science Foundation - [http://www.nsf.gov/statistics/nsf10311/content.cfm?pub\\_id=3944&id=2](http://www.nsf.gov/statistics/nsf10311/content.cfm?pub_id=3944&id=2)

**Table A8: Venture Capital vs. 21st Century Trends**

	VC Dollars	VC Deals	# of 21st Century Funded Projects
1995	\$ 9,103,000.00	7	
1996	\$ 22,766,000.00	8	
1997	\$ 25,173,112.00	12	
1998	\$ 38,955,000.00	8	
1999	\$ 46,699,900.00	11	
2000	\$ 268,974,900.00	26	12
2001	\$ 53,754,800.00	6	20
2002	\$ 39,404,000.00	10	14
2003	\$ 24,500,000.00	8	18
2004	\$ 67,250,200.00	9	21
2005	\$ 103,629,900.00	11	18
2006	\$ 70,296,200.00	14	21
2007	\$ 82,593,700.00	16	17
2008	\$ 123,600,000.00	16	21

Source: State Science and Technology Institute - <http://www.ssti.org/vc/indiana/all.php>

Primary Source: PricewaterhouseCoopers/National Venture Capital Association Money Tree Report

Data: Thomson Financial

**Table A9: *Employment Trend for Selected Industries***

Employment by Industry	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Pharmaceutical and Medicine Mfg	9747	10301	11006	10731	11438	10694	11261	11256	11496	11337
Metalworking Machinery Mfg	11455	10588	10491	10248	8499	7650	7249	7403	7308	6820
Semiconductor and Other Electronic Component Mfg	10586	9915	10100	9436	8010	6052	4996	4372	4155	4003
Navigational, Measuring, Electro-medical, and Control Instruments Mfg	5101	5253	5492	5759	4505	6299	6116	5408	5371	5081
Aerospace Product and Parts Mfg	8055	8314	8319	9186	7840	6497	5920	7039	6135	7252
Software Publishers	1785	1788	1610	1449	1263	1475	1284	1383	1313	1591
Engineering Services	10291	10407	10549	11101	10062	12277	13219	14430	14140	14314
Computer Systems Design & Related Services	10714	11303	11954	12099	10557	9300	9176	9669	9655	10269

Source: County Business Patterns - <http://www.census.gov/econ/cbp/>

**Table A10: *Establishment Trend for Selected Industries***

Total Establishments	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Pharmaceutical and Medicine Mfg	31	33	31	32	38	34	36	35	37	37
Metalworking Machinery Mfg	524	514	493	480	466	424	418	408	383	383
Semiconductor and Other Electronic Component Mfg	106	105	103	96	87	84	84	77	78	75
Navigational, Measuring, Electro-medical, and Control Instruments Mfg	88	83	82	83	81	96	97	91	91	92
Aerospace Product and Parts Mfg	31	30	31	31	34	23	25	25	25	25
Software Publishers	117	110	104	106	95	71	67	67	71	70
Engineering Services	935	971	969	956	954	943	975	998	1016	987
Computer Systems Design & Related Services	1076	1172	1242	1235	1250	1279	1322	1355	1412	1490

Source: County Business Patterns - <http://www.census.gov/econ/cbp/>

**Table A11: Annual Payroll Trend (inflation adjusted) for Selected Industries**

Annual Payroll (in \$1000) Inflation Adj	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Pharmaceutical and Medicine Mfg	\$ 910,265	\$ 850,067	\$ 939,442	\$ 904,610	\$ 979,338	\$ 896,323	\$ 940,033	\$ 828,964	\$ 989,138	\$ 855,855
Metalworking Machinery Mfg	\$ 545,612	\$ 515,074	\$ 496,168	\$ 440,918	\$ 384,504	\$ 349,713	\$ 341,034	\$ 340,885	\$ 338,744	\$ 310,501
Semiconductor and Other Electronic Component Mfg	\$ 378,169	\$ 391,979	\$ 398,671	\$ 346,860	\$ 304,815	\$ 233,081	\$ 192,005	\$ 169,359	\$ 165,056	\$ 159,411
Navigational, Measuring, Electro-medical, and Control Instruments Mfg	\$ 209,403	\$ 218,663	\$ 228,279	\$ 243,246	\$ 223,358	\$ 350,659	\$ 324,044	\$ 243,078	\$ 244,259	\$ 258,513
Aerospace Product and Parts Mfg	\$ 599,216	\$ 612,240	\$ 587,878	\$ 598,890	\$ 570,689	\$ 510,207	\$ 490,714	\$ 537,374	\$ 546,140	\$ 546,601
Software Publishers	\$ 118,555	\$ 112,208	\$ 111,127	\$ 100,568	\$ 94,657	\$ 130,383	\$ 125,316	\$ 134,121	\$ 137,870	\$ 167,142
Engineering Services	\$ 541,608	\$ 566,575	\$ 583,868	\$ 606,488	\$ 551,124	\$ 773,325	\$ 842,536	\$ 857,690	\$ 876,698	\$ 925,691
Computer Systems Design & Related Services	\$ 662,504	\$ 773,676	\$ 769,910	\$ 729,500	\$ 655,972	\$ 578,913	\$ 540,339	\$ 573,143	\$ 592,602	\$ 656,212

Source: County Business Patterns - <http://www.census.gov/econ/cbp/>



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### About the Center

The Center for Business and Economic Research, formerly the Bureau of Business Research, is an award-winning economic policy and forecasting research center housed within the Miller College of Business. CBER research encompasses health care, public finance, regional economics, transportation, and energy sector studies.

In addition to research, we serve as the forecasting element in the Muncie area—holding five state and federal economic forecasting roundtables.